

Abstract

Geophagy or deliberate ingestion of soils has been observed among Asian elephants (*Elephas maximus*) in the Udawalwe National Park, Sri Lanka, for several years. The geochemical and mineralogical composition of the clayey soil layers which are purposefully selected and eaten by elephants in the park were studied, in order to identify the possible reasons for elephant geophagy. The concentrations of major and trace elements were determined by means of X-ray fluorescence spectrometry in 21 soil samples from eight geophagic sites and six soil samples collected from four non-geophagic sites. The mineralogical composition of selected soil samples was investigated using X-ray diffractometry (XRD). The geochemical analyses revealed that the geophagic soils in the study areas are deeply weathered and most of the trace elements are leached from the soil layers under extreme weathering conditions. The XRD data shows that the soils of the area consisted mainly quartz, feldspar, and the clay minerals mainly kaolinite, Fe-rich illite, and smectite. Although no significant geochemical differences were identified between geophagic and non-geophagic soils, a clear difference was observed in their clay mineralogical content. Soils eaten by elephants are richer in kaolinite and illite than non-geophagic soils, which contain a higher amount of smectite. It is suggested that elephants in Udawalawe National Park ingest soils mainly not to supplement the mineral contents of their forage but to detoxify unpalatable compounds in their diet.

Keyword Mammalian herbivores Geophagy, Soils Asian elephants *Elephas maximus* Clay minerals Udawalawe National Park